



An Investigation of Motivational Variables and their Influence on Vietnamese University Students' Scientific Research Participation

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ABSTRACT

This research aims to explore the motivation for scientific research among university students in Vietnam and its impact on students' intention to participate. A sample of 510 students was surveyed, and data was analyzed using SPSS. The study found that three out of four motivating factors had a significant impact on students' intention to participate in scientific research. Among these factors, intrinsic motivation had the most significant influence, while identified regulation did not have a significant impact. The findings of this study can be useful in developing strategies to enhance students' motivation and engagement in scientific research activities.

Keywords: Motivation, Scientific research, Students, Extrinsic motivators, Intrinsic motivator

Introduction

Scientific research is an essential component of the higher education system, providing students with opportunities to apply their knowledge and skills to real-world problems, and contributing to the advancement of knowledge and innovation (Lamanauskas & Augienė, 2014). However, research participation among university students is often low, and motivating students to engage in scientific research is a challenging task for universities. In Vietnam, the importance of scientific research has been recognized, and universities have made efforts to promote research activities among students. However, little is known about the factors that motivate Vietnamese university students to participate in scientific research (Oanh, 2013).

Motivation is a crucial factor in driving behavior, and understanding the motivational variables that influence students' participation in scientific research is essential for universities to design effective strategies to promote research activities among students (Patrick, Anderman, & Ryan, 2002). Previous studies have identified several motivational variables, such as intrinsic motivation, identified regulation, introjected regulation, and external regulation, that influence research participation among university students. However, the influence of these motivational variables on Vietnamese university students' research participation has not been investigated.

In Vietnam, in the context of the Fourth Industrial Revolution and the current process of globalization, the training process of universities also poses many challenges. Scientific research in general and student scientific research play an important role in the activities of universities, thereby aiming to improve the quality of student learning, enhance the quality of education of the university, and facilitate educational evaluation (MOET, 2021).

Therefore, the present study aims to investigate the motivational variables and their influence on Vietnamese university students' scientific research participation. This study aims to answer the following questions: How is students' motivation reflected through the measured variables in scientific research activities? Do motivational factors affect students' intention to participate in scientific research? What solutions can be implemented to promote motivation and encourage students to participate more in scientific research activities? The findings from this study will provide insights into the factors that motivate Vietnamese university students to participate in scientific research, and help universities to design effective strategies to promote research activities among students.

Literature reviews

The study of motivational variables in scientific research participation has been a popular topic in educational research. Several studies have identified various factors that influence students' motivation to participate in scientific research. Numerous studies have focused on the factors that influence students' motivation to participate educational activities, including social support, perceived competence, autonomy, interest, and relevance (Guay, Vallerand, & Blanchard, 2000; Soares, Lemos, & Almeida, 2005; Sun & Gao, 2020). These factors play a critical role in shaping students' motivation to participate in research activities.

According to Deci and Ryan's self-determination theory, intrinsic motivation, extrinsic motivation, and amotivation are the three motivational types that determine the engagement of students in research activities (Deci & Ryan, 2012). Intrinsic motivation is the internal drive of an individual to participate in research activities, whereas extrinsic motivation is the external factors that influence participation, such as rewards and recognition. Amotivation is the lack of motivation to engage in research activities. This study will focus on extrinsic motivation and intrinsic motivation.

When applied to education, the self-determination theory primarily aims to foster students' interest in learning, appreciation for education, and confidence in their own abilities and characteristics. These outcomes are indicative of intrinsic motivation and the internalization of values and regulatory processes. Research suggests that such processes lead to high-quality learning, conceptual understanding, personal growth, and adjustment. Various contextual conditions have been identified that facilitate motivation, performance, and development in multiple studies. In essence, motivation, performance, and development are maximized in social contexts that allow individuals to fulfill their fundamental psychological needs for autonomy, competence, and relatedness. These three needs are crucial for both teachers and students. While satisfying the need for autonomy is essential for promoting intrinsic motivation rather than controlled behavior.

Intrinsic motivation refers to the inherent drive or natural desire within an individual to engage in an activity for its own sake, rather than for any external reward or punishment. It is characterized by a sense of enjoyment, interest, or satisfaction in the activity itself, and a desire to learn, explore, or accomplish something based on personal interest or curiosity. Intrinsic motivation is often associated with higher levels of engagement, persistence, and creativity in the activity, as well as greater learning and personal growth. In the domain of education, intrinsic motivation is widely recognized as a central aspect of adaptive self-regulation (Ginsburg & Bronstein, 1993). Intrinsic and extrinsic motivation are often viewed as opposite ends of the same continuum. Students who are intrinsically motivated tend to be more interested in exploring and extending their knowledge and skills, and they often exhibit greater effort, persistence, and adaptive emotional responses when faced with difficulties. Students who are intrinsically motivated also tend to view failures as opportunities to reevaluate their knowledge, strategies, and behaviors in a constructive manner (Pintrich, 2002). Intrinsic and extrinsic motivation are often viewed as opposite ends of the same continuum. Students who are intrinsically motivated tend to be more interested in exploring and extending their knowledge and skills, and they often exhibit greater effort, persistence, and adaptive emotional responses when faced with difficulties. Students who are intrinsically motivated also tend to view failures as opportunities to reevaluate their knowledge, strategies, and behaviors in a constructive manner (Pintrich, 2002 ; Gottfried, 1990; Pintrich & Zusho, 2002)

Extrinsic motivation refers to the motivation that arises from external factors or rewards, rather than from the inherent enjoyment or interest in the activity itself. In self-determination theory (SDT), extrinsic motivation is classified into three subtypes:

- Identified regulation: This refers to a type of extrinsic motivation where an individual engages in an activity because they have identified the personal value or importance of the activity. Although the activity may not be inherently enjoyable, the individual sees the benefits of engaging in the activity, and does so willingly.
- External regulation: This refers to a type of extrinsic motivation where an individual engages in an activity purely to gain external rewards or avoid punishment. The individual's behavior is primarily driven by external factors, such as money, grades, or social approval.
- Introject regulation: This refers to a type of extrinsic motivation where an individual engages in an activity to avoid guilt, shame, or anxiety, rather than because they find the activity inherently interesting or enjoyable. The individual may feel compelled to engage in the activity due to internalized expectations or pressure from others. However, introjected regulation is still considered extrinsic because the motivation is not arising from the inherent value or enjoyment of the activity.

Many studies have applied the SDT theory to explain human behavior in various fields, which confirms its importance (Standage, Duda, & Ntoumanis, 2003; Sun & Gao, 2020). Therefore, using this theory, specifically the motivational factors, to explain and understand the motivation and intention of students to participate in research is entirely appropriate.

Research methodology

Participants: The participants in this study were university students from a central city in Vietnam. We collected responses from a total of 510 students.

Data Collection: Data was collected through a survey using a structured questionnaire. The questionnaire consisted of items that assessed the levels of three variables related with extrinsic motivation, which are Introject Regulation, Identified Regulation, External Regulation and one variable for intrinsic motivation in relationship with students' intention to participate in scientific research. These variables with measurement items were derived from the SDT of (Deci & Ryan, 1980) and previous studies (Fedorková & Nekvapilová, 2019; Gillet, Vallerand, Amoura, & Baldes, 2010). The survey was administered to the participants in person.

Data Analysis: The collected data, consisting of responses from 510 students, was analyzed using the Statistical Package for Social Sciences (SPSS) software. Descriptive statistics including frequencies, percentages, means, and standard deviations were utilized to analyze the data. Additionally, linear regression analysis was conducted to explore the impact of motivating factors on students' intention to participate in scientific research.

Ethical Considerations: The study was conducted in accordance with ethical principles and guidelines. Informed consent was obtained from all participants before they were included in the study. The participants were informed about the purpose of the study and were assured that their responses would be kept confidential.

Results of evaluation of intrinsic and extrinsic motivation of students in doing scientific research

Demographic characteristics of respondents

The table 1 below presents the characteristics of the respondents based on their gender, class year, and the source of information they received about student scientific research. Out of 510 respondents, 477 (93.5%) were women and 33 (6.5%) were men. In terms of class year, the highest percentage of respondents were from the second year (45.1%), followed by the fourth year (28.2%), the third year (22.4%), and the first year (4.3%).

The respondents obtained information about student scientific research from various sources, with the highest percentage of respondents obtaining information from teachers (38.6%), followed by university (21.0%), classes (19.6%), faculty (14.9%), friends (4.7%), and others (1.2%).

Table 1 – Summary of characteristics of respondents

Variable	Characteristics	Number	Percent (%)
Gender	Women	477	93.5
	Men	33	6.5
Class year	1	22	4.3
	2	230	45.1
	3	114	22.4
	4	144	28.2
Source of information about student scientific research	University	107	21.0
	Faculty	76	14.9
	Classes	100	19.6
	Friends	24	4.7
	Teachers	197	38.6
	Others	6	1.2

Descriptive Statistics and reliability analysis of independent variables and dependent variables

Table 2 - Descriptive Statistics and reliability analysis of Intrinsic motivation - YT

Intrinsic motivation – YT (AVE = 0.85, Cronbach's Alpha = 0.627)	Outer loadings	Minimum	Maximum	Mean	Std. Deviation
YT1	0.782	1	5	3.55	.963
YT2	0.847	1	5	4.03	.893
YT3	0.82	1	5	3.61	.934
YT4	0.713	1	5	4.15	.882
YT5	0.79	1	5	3.87	.866

The results in table 2 show the mean and standard deviation of a variable called "Passion motivators in doing scientific research" across five different groups labeled as YT1, YT2, YT3, YT4, and YT5. The minimum value for the variable across all groups was 1, while the maximum value was 5. The mean scores varied across groups, with YT4 having the highest mean score of 4.15 (*I will be very satisfied with myself if I can participate in and complete student scientific research*) followed by YT2 with a mean score of 4.03. The lowest mean score was observed in YT1 with a mean score of 3.55. The standard deviation values show the amount of variation or dispersion in the data within each group. The standard deviation values ranged from 0.866 to 0.963, indicating that the data points were relatively close to the mean in each group. Giá trị trung bình của thang đo YT được tính bằng trị trung bình của các chỉ báo và bằng 3.84.

Table 3 - Descriptive Statistics of Identified Regulation

Identified Regulation - NT (AVE = 0.645, Cronbach's alpha = 0.817)	Outer loadings	Minimum	Maximum	Mean	Std. Deviation
NT1	0.79	1	5	4.17	.800
NT2	0.769	1	5	4.08	.888
NT3	0.816	1	5	4.33	.781
NT4	0.689	1	5	3.96	.921
NT5	0.761	1	5	4.12	.833

As shown in table 3, the average of the scale is 4.13. The highest value is for the indicator NT3: "Because scientific research is necessary to develop research skills."

Table 4 - Descriptive Statistics of Introject Regulation

Introject Regulation - TH (AVE =0.688,Cronbach's Alpha= 0.847)	Outer loadings	Minimum	Maximum	Mean	Std. Deviation
TH1	0.864	1	5	2.88	1.175
TH2	0.879	1	5	2.77	1.188
TH3	0.861	1	5	2.87	1.196
TH4	0.7	1	5	3.61	.965
TH5	0.864	1	5	4.16	.866

The table 4 shows that the average value is of Introject Regulation scale is 3.26. The highest value is for the indicator TH5: "I want to establish credibility and prestige for myself through scientific research."

Table 5 - Descriptive Statistics of External Regulation

External Regulation - LI (AVE = 0.645, Cronbach's Alpha = 0.816)	Outer loadings	Minimum	Maximum	Mean	Std. Deviation
LI1	0.799	1	5	3.79	1.039
LI2	0.772	1	5	4.16	.888
LI3	0.779	1	5	3.54	1.111
LI4	0.858	1	5	3.84	1.028

As in table 5, the average value of this scale is 3.83, and the highest value is for the indicator LI2 = 4.16: "Because I can do well in my thesis after gaining experience in scientific research."

Table 6 - Descriptive Statistics of Intention of students to carry out scientific research

Intention of students - YD (AVE = 0.627, Cronbach's Alpha= 0.85)	Outer loadings	Minimum	Maximum	Mean	Std. Deviation
YD1	0.894	1	5	3.39	1.048
YD2	0.919	1	5	3.41	1.085
YD3	0.914	1	5	3.61	1.043
YD4	0.913	1	5	3.49	1.048

The table 6 indicates that the average value of the YD scale is 3.48, and the highest value is for the indicator YD3 = 0.361: "I will make a great effort to participate in scientific research."

All indicators in the measurement scales from Table 2 to Table 6 have outer loadings that are approximately or greater than 0.7, which is consistent with the reference values of previous studies(Götz, Liehr-Gobbers, & Krafft, 2009; Henseler, Ringle, & Sinkovics, 2009). The Cronbach's Alpha values of the measurement scales are all greater than 0.7, and the AVE values are all greater than 0.5, indicating that the measurement scales meet the requirements for reliability and convergent validity(Fornell & Larcker, 1981; Hair, Black, Babin, Anderson, & Tatham, 2006).

New variables were generated in the statistical software SPSS using the Transform function.

YD=mean(YD1,YD2,YD3,YD4).

YT=mean(YT1,YT2,YT3,YT4,YT5).

NT=mean(NT1,NT2,NT3,NT4,NT5).

TH=mean(TH1,TH2,TH3,TH4,TH5).

LI=mean(LI1,LI2,LI3,LI4).

Correlation of research variables

Table 7 -Correlations analysis

		YD	YT	NT	TH	LI
YD	Pearson Correlation	1	.638**	.468**	.378**	.360**
	Sig. (2-tailed)		.000	.000	.000	.000

	N	510	510	510	510	510
YT	Pearson Correlation	.638**	1	.684**	.388**	.385**
	Sig. (2-tailed)	.000		.000	.000	.000
	N	510	510	510	510	510
NT	Pearson Correlation	.468**	.684**	1	.391**	.477**
	Sig. (2-tailed)	.000	.000		.000	.000
	N	510	510	510	510	510
TH	Pearson Correlation	.378**	.388**	.391**	1	.576**
	Sig. (2-tailed)	.000	.000	.000		.000
	N	510	510	510	510	510
LI	Pearson Correlation	.360**	.385**	.477**	.576**	1
	Sig. (2-tailed)	.000	.000	.000	.000	
	N	510	510	510	510	510

** . Correlation is significant at the 0.01 level (2-tailed).

The results of the correlation analysis in table 7 indicate that there is no issue of multicollinearity between the variables. Therefore, the conditions for conducting regression analysis are met.

Linear regression analysis

Linear regression analysis examines the impact of independent variables on a dependent variable. This analysis aims to explore the influence of motivational factors on intention (dependent variable). The results of the analysis will provide information on the direction and strength of the relationship between the variables, and help identify which motivational factors have a significant impact on intention. This information can be used to inform interventions or strategies aimed at promoting or increasing intention in a particular context.

Table 8 -Regression analysis investigates the impact of predictor variables on the outcome variable.

Coefficients ^a						
Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	-.206	.222		-.928	.354
	YT	.753	.063	.562	12.013	.000
	NT	.002	.072	.001	.028	.978
	TH	.132	.048	.115	2.738	.006
	LI	.090	.051	.077	1.761	.079

a. Dependent Variable: YD

5. Discussions and conclusions

The aim of this study was to explore the motivations for scientific research among university students in Vietnam and their impact on students' intention to participate. In this discussion, we analyzed the results of a regression analysis that investigated the relationship between different motivating variables and students' intention to participate in scientific research. Specifically, we examined the mean values of the motivating variables, their beta coefficients, and p-values to determine the extent to which they affected students' intention to participate. We found that intrinsic motivation had the greatest impact on students' intention to participate, while identified regulation had no significant impact. The implications of these findings for promoting scientific research among university students in Vietnam are discussed in this paper.

The findings from the regression analysis in table 8 show that Intrinsic motivation YT has the strongest impact on students' intention to participate in scientific research, as evidenced by its beta coefficient of 0.753 and p-value of less than 0.01. This result suggests that universities should prioritize strategies to enhance students' interest in scientific research in order to motivate them to participate in this activity. For example, universities can design courses and extracurricular activities that highlight the fun and excitement of scientific research, and provide opportunities for students to engage in hands-on research projects.

Although Identified Regulation NT has the highest mean value among the motivation variables, it did not have a significant impact on students' intention to participate in scientific research. This result is surprising, and suggests that students may not be motivated by external rewards or pressure to engage in research. Universities should consider alternative ways to motivate students, such as providing opportunities for students to collaborate with faculty on research projects, or offering research grants and scholarships.

The results also indicate that Introject Regulation TH has a significant impact on students' intention to participate in scientific research, as evidenced by its beta coefficient of 0.132 and p-value of less than 0.01. This suggests that universities should recognize and reward outstanding students who excel in

research, and provide opportunities for them to showcase their work to other students and faculty. By doing so, universities can foster a culture of excellence in scientific research and motivate more students to participate.

External Regulation LI also had a positive impact on students' intention to participate in scientific research, although the impact was weaker than expected, as indicated by its beta coefficient of 0.09 and p-value of less than 0.1. This result suggests that universities should do a better job of educating students about the benefits of scientific research, such as the potential to gain new knowledge, develop critical thinking skills, and enhance their career prospects.

In conclusion, the findings from this study suggest that universities should focus on enhancing students' intrinsic motivation to participate in scientific research, while also recognizing and rewarding outstanding students and educating students about the benefits of research. By doing so, universities can foster a culture of excellence in scientific research and motivate more students to engage in this important activity.

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